Let $\$x$=the sum he should receive monthly. But $6000\times .015=\$90=$ quarterly interest. $\therefore$ $1.015x+1.01x+1.005x=\$90$. $\therefore$ $3.03x=\$90$. $x=\$29.70297+$.

Also solved by *P. S. BERG*, *F. P. MATZ*, *J. SCHEFFER*, and *G. B. M. ZERR*.

NOTE.—Solutions of Nos. 46 and 47, Algebra, were received too late for selection from Prof. Benj. F. Yanney, A. M., Mount Union College, Alliance, Ohio.

PROBLEMS.

56. Proposed by D. G. DORRANCE, Jr., Camden, Oneida County, New York.

* Sum the series 1, 1, 1, 2, 3, 4, 6, 9, 13, 19, etc., to n terms; also what is the n^{th} term?

57. Proposed by DAVID EUGENE SMITH, Ph. D., Professor of Mathematics, Michigan State Normal School, Ypsilanti, Michigan.

Prove that the product of the n n^{th} roots of 1 is $+1$ or -1 according as n is odd or even. Prove, and generalize, for the n n^{th} roots of m.

58. Proposed by ROBERT JUDSON ALEY, M. A., Associate Professor of Mathematics, Leland Stanford Jr. University, Palo Alto, California.

Telegraph poles are a yards apart; for how many minutes must one count poles in order that the number of poles counted may be equal to the number of miles per hour that the train is running?

Solutions of these Problems should be received on or before January 1, 1896.

GEOMETRY.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

45. Proposed by GEORGE E. BROCKWAY, Boston, Massachusetts.

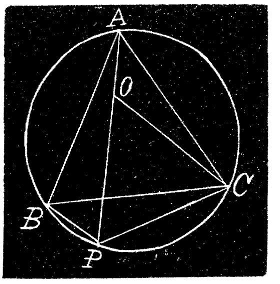
If an equilateral triangle is inscribed in a circle, the sum of the squares of the lines joining any point in the circumference to the three vertices of the triangle is constant.

Solution by JAMES F. LAWRENCE, Breckenridge, Missouri.

Let ABC be the inscribed equilateral triangle and P any point in the circumference of the circle. Join P with the points A, B, and C.

Then $AB^2=BP^2+AP^2-2BP\times AP\cos 60^\circ$

$=BP^2+AP^2-BP\times AP$, and



$$AC^2=CP^2+AP^2-2CP\times AP\cos 60^\circ$$
$$=CP^2+AP^2-CP\times AP.$$

$\therefore\ AB^2+AC^2=BP^2+AP^2+CP^2+AP^2-[BP\times AP+CP\times AP]$.

But $AP=BP+PC$, AMERICAN MATHEMATICAL MONTHLY, Vol. I., No. 9, p. 315, Prob. 19.

$AP^2=BP\times AP+PC\times AP$, by multiplying both sides of the above equation by AP.

$\therefore\ AP^2-[BP\times AP+PC\times AP]=0.$

$\therefore\ AB^2+AC^2=BP^2+AP^2+CP^2$, and $BP^2+AP^2+CP^2$ is constant. Q. E. D.

Excellent solutions of this Problem were received from *P. S. BERG, G. B. M. ZERR, O. W. ANTHONY, COOPER D. SCHMITT, J. F. W. SCHEFFER, JOHN B. FAUGHT, G. I. HOPKINS*, and *E. W. MORRELL*. Two solutions were received without the names of the authors signed to them.

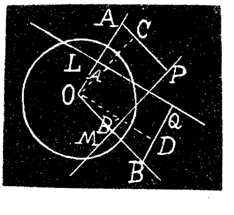
46. Proposed by J. C. GREGG, Superintendent of Schools, Brazil, Indiana.

Given two points A and B and a circle whose center is O: show that the rectangle contained by OA and the perpendicular from B on the polar of A, is equal to the rectangle contained by OB and the perpendicular from A on the polar B.

Solution by JOHN B. FAUGHT, A. B., Instructor in Mathematics, Indiana University, Bloomington, Indiana; P. S. BERG, Larimore. North Dakota; and J. F. W. SCHEFFER, A. M., Hagerstown, Maryland.

Let L be the polar of A, and M the polar of B. Let AP be a perpendicular on M, and BA a perpendicular on L.

Draw OC parallel to M, and OD parallel to L. Then $OA.OA'=OB.OB'=R^2$, by definition.



$$\therefore \frac{OA}{OB}=\frac{OB'}{OA'}=\frac{CP}{BA}.$$

The triangles OAC and OBD are similar.

$$\therefore \frac{OA}{OB}=\frac{AC}{BD}=\frac{CP}{DA}=\frac{AC+CP}{BD+DA}=\frac{AP}{DA}.$$

$\therefore\ OA.BA=OB.AP.$ Q. E. D.

Excellent analytical solutions of this problem were received from *G. B. M. ZERR, COOPER D. SCHMITT*, and *E. W. MORRELL*. Prof. Morrell sent in two solutions.

A solution was also received without the author's name signed to it.

PROBLEMS.

52. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in Irving College, Mechanicsburg, Pennsylvania.

If the *center* of a rolling ellipse *move in a horizontal line*, determine the surface on which the ellipse rolls.